



2016 Kansas Flint Hills Update

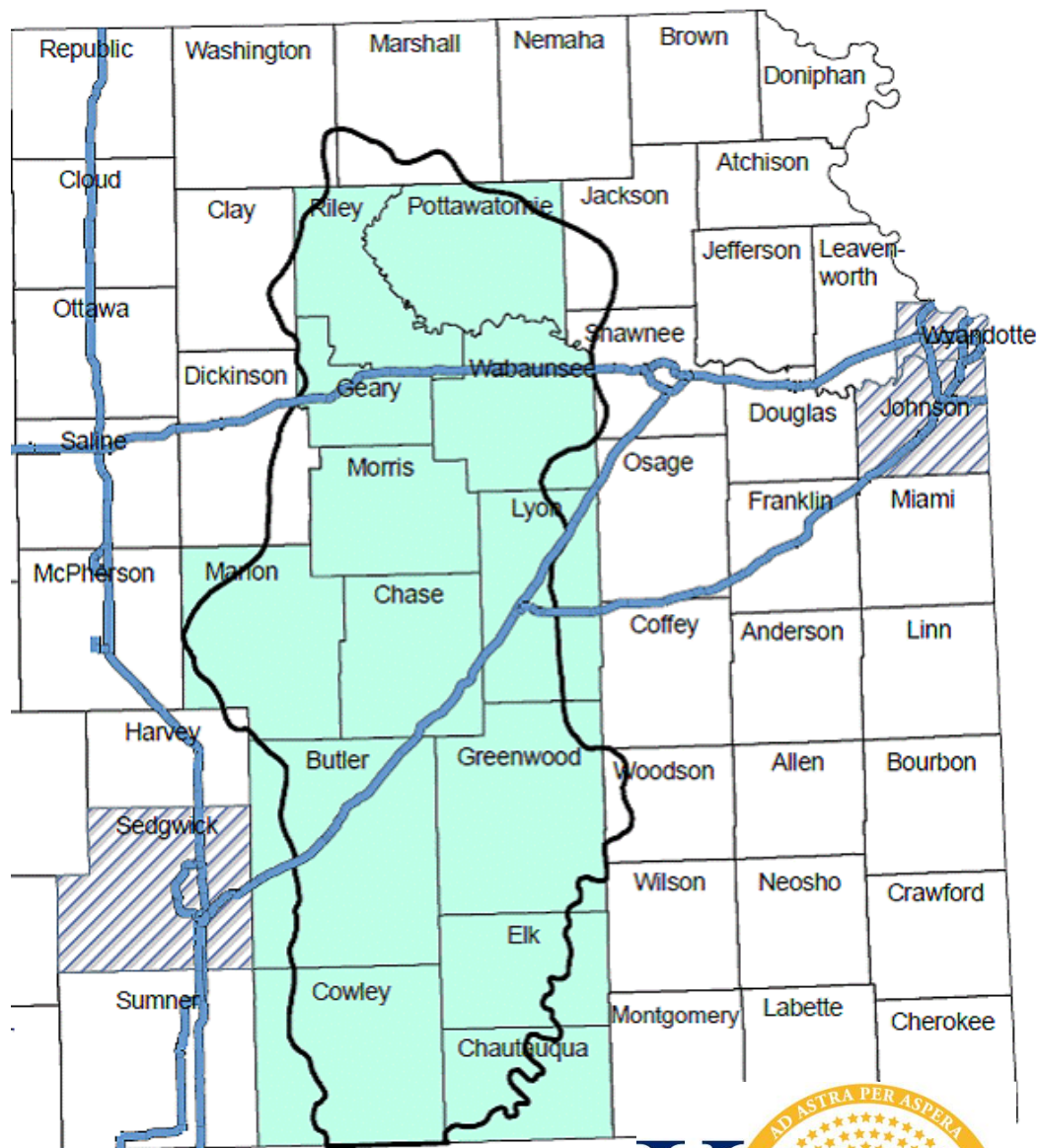
Kansas Environmental Conference
Hutchinson, KS
August 10, 2016

Douglas Watson, Meteorologist
Chief, Monitoring and Planning Section
Bureau of Air
Kansas Department of Health and Environment

Historic Tallgrass Prairie vs. current



Flint Hills ecosystem and SMP Counties



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Flint Hills Burning Background

- Flint Hills ecosystem covers all or parts of 13 Kansas counties
- Prairie burned in March/April to preserve the ecosystem by controlling invasive trees, shrubs and plants and to improve cattle weight gain
- Safety conditions limit number of days that are suitable for burning
- Approx. 2,800,000 acres burned in 2016
- Burning caused ozone exceedances in 2003, 2009, 2010, 2011, 2014, 2015 and 2016
- Burning caused PM_{2.5} exceedances in 2014 and 2016

Flint Hills Smoke Management Plan

- Is voluntary for prescribed burns of rangeland
- Includes restrictions on certain types of burning in April
- Includes tools to assist land managers and local fire officials in making burn decisions
- A web site hosted by KSU – (www.ksfire.org)
 - Modeling tool to predict smoke impacts
 - Prescribed fire guidance information
 - Links to weather, burn bans, SMP and other related materials
- Outreach and education
- KDHE has had contract with KSU since 2011 for outreach/education and website hosting.

Flint Hills Counties (acres burned by year)

Flint Hills Prescribed Fire Acreage Burned by Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Butler	297,653	177,390	74,487	259,012	126,162	309,962	91,182	121,838	268,031	293,761	241,189	213,883	45,004	13,097	166,442	94,349	245,921
Chase	318,718	184,340	168,541	278,487	186,857	340,772	197,467	54,425	286,610	310,487	280,124	255,240	28,912	5,174	288,529	218,860	318,679
Chautauqua	91,506	47,660	26,857	123,460	75,120	115,197	65,112	21,575	85,390	123,043	38,919	79,226	12,819	3,985	113,499	71,321	94,473
Coffey	68,649	28,216	94,996	88,525	41,683	112,402	101,081	61,282	75,460	122,857	42,255	77,612	26,162	11,166	77,298	81,978	76,450
Cowley	171,614	110,842	21,915	199,444	112,834	194,162	63,737	65,021	189,128	149,128	127,212	134,002	18,193	3,907	92,804	61,036	158,984
Elk	128,927	114,857	58,564	157,514	105,050	159,537	66,595	60,341	148,062	177,807	126,718	124,363	35,027	8,680	167,647	92,990	171,757
Geary	46,332	41,359	30,116	30,487	44,355	103,444	59,166	23,104	68,185	75,846	61,915	56,120	52,418	6,039	47,769	15,583	51,492
Greenwood	302,487	150,888	178,487	333,823	152,278	356,278	182,703	137,252	307,182	353,745	271,861	258,973	29,993	18,873	250,042	247,741	284,624
Lyon	165,282	84,371	144,402	188,865	104,016	214,286	221,128	61,838	158,610	203,382	121,699	160,604	43,336	14,471	143,075	156,975	174,213
Marion	64,958	26,317	12,000	53,931	26,672	80,896	15,985	10,378	52,788	62,131	60,649	45,632	8,324	3,228	44,402	28,124	75,647
Morris	134,363	76,880	81,050	106,734	68,757	171,599	138,054	18,533	125,205	111,938	126,595	114,117	16,155	2,162	107,600	64,433	149,780
Osage (KS)	92,030	63,692	46,933	93,107	60,315	114,361	65,419	33,152	92,782	104,903	78,559	81,210	42,657	10,008	77,901	66,070	64,974
Pottawatomie	107,660	131,645	70,471	42,224	103,629	169,884	92,803	58,502	124,247	126,178	119,784	108,853	124,480	5,961	120,882	63,229	89,114
Riley	90,749	77,714	71,413	63,073	71,073	128,046	97,143	70,457	92,479	116,510	86,703	89,490	85,561	36,201	84,032	50,039	64,110
Wabaunsee	195,444	128,741	136,664	173,591	157,359	281,467	273,684	91,723	240,880	261,838	183,521	203,319	64,047	23,552	240,173	102,349	199,804
Wilson	50,605	35,022	25,807	51,197	33,166	62,884	35,972	10,969	51,019	57,684	43,198	44,655	7,985	8,417	33,236	22,688	23,136
Woodson	73,838	73,266	48,386	85,375	62,100	99,043	52,664	54,981	86,301	97,622	59,954	73,855	19,599	12,124	82,271	82,596	79,276
Nowata (OK)	48,162	33,332	24,562	48,726	31,565	59,849	34,236	18,355	48,556	54,900	41,113	42,500	4,880	4,834	68,217	64,773	48,186
Osage (OK)	303,691	318,518	88,139	407,321	241,066	346,533	102,595	78,575	274,255	333,962	237,792	265,387	36,155	22,147	275,278	206,504	301,258
Washington (OK)	50,295	34,808	25,649	50,884	32,963	62,499	35,752	14,504	50,706	57,331	42,933	44,382	4,309	3,351	48,371	45,669	32,387
Kay (OK)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	32,711	32,526
	2,802,963	1,939,859	1,429,438	2,835,778	1,837,021	3,483,101	1,992,477	1,066,809	2,825,876	3,195,053	2,392,693	2,473,423	706,016	217,377	2,529,468	1,870,018	2,736,791

No burn scar data available; Estimated based on year's overall average burn rate multiplied by county's grassland acreage

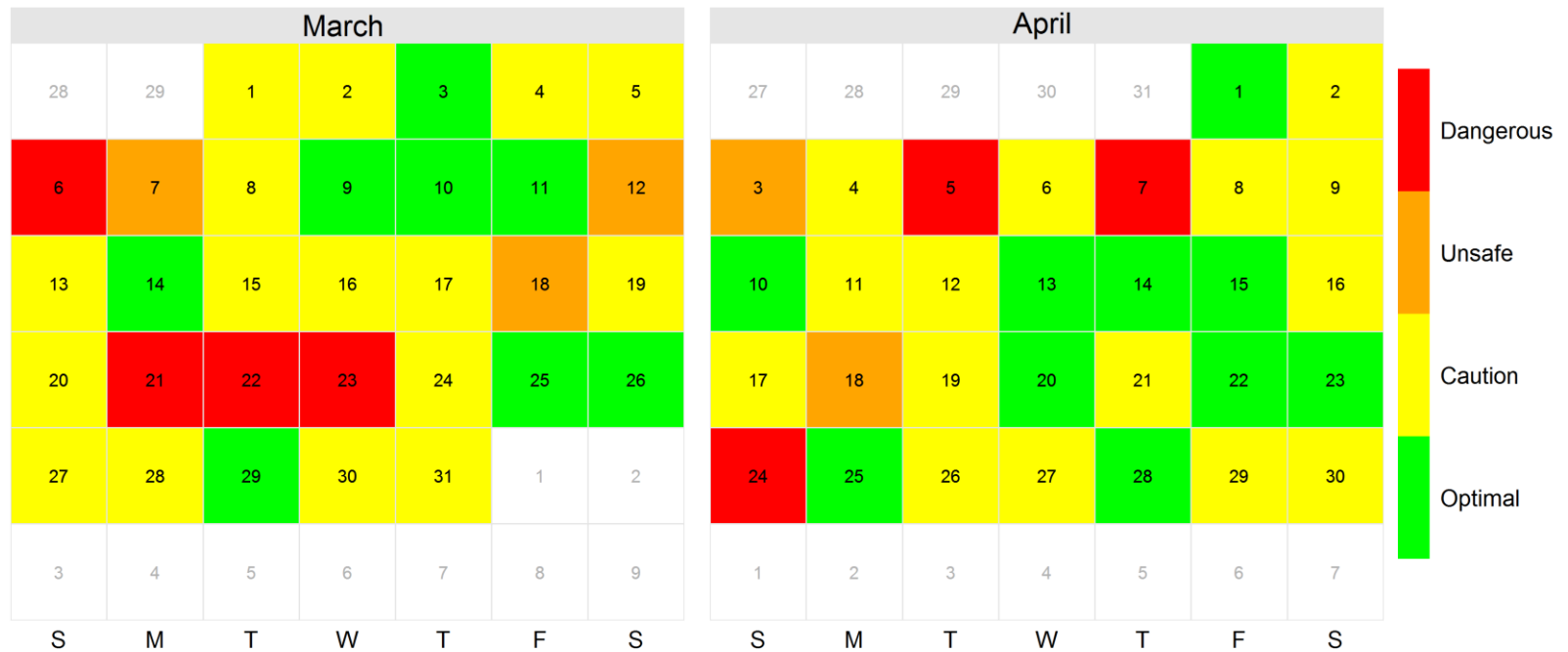
Average Acres Burned 2000-2016
2,137,304

Average Acres Burned 2000-2016 w/o 2012-2013 drought years
2,360,718

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2016 Flint Hills Prescribed Burning Weather (Emporia, KS Overall Surface Weather Conditions)



	<u>Wind Speed (MPH)</u>	<u>Rel Humidity</u>	<u>Temperature (F)</u>	<u>Sky Conditions</u>
Optimal	Avg < 20 / Max < 30	30-70%	50-80	CC < 70%
Caution	Avg < 25 / Max < 35	> 20%	40-85	CH > 3000'
Unsafe	Avg < 25 / Max < 35	> 20%	< 100	CH < 3000' & CC > 70%
Dangerous	Avg > 25 / Max > 35	< 20%	> 100	CH < 3000' & CC > 70%

For 2016 this calculated to be: 18 Optimal days, 31 Caution days, 5 Unsafe days, and 7 Dangerous days. Note that only 3 Optimal days occurred on a weekend; the rest were weekdays.

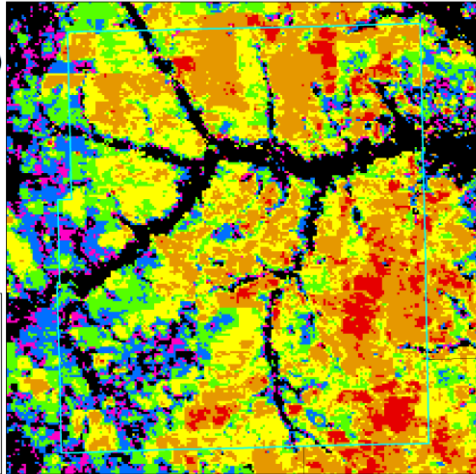
Flint Hills Burn Intervals (2000-2016 Data)

Chase County,
Kansas

Satellite Analysis from:
Kansas State University
Kansas Department
of Health & Environment

Map Created by
Jayson Prentice

Burn Interval



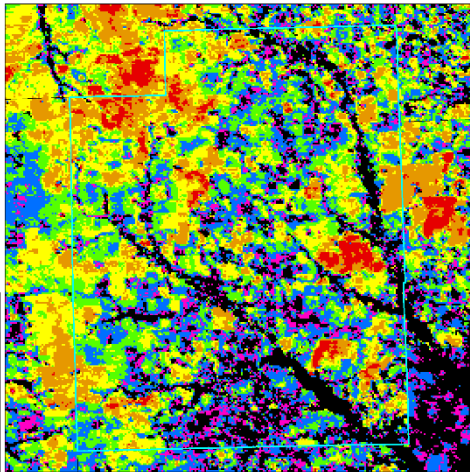
Flint Hills Burn Intervals (2000-2016 Data)

Greenwood Co.,
Kansas

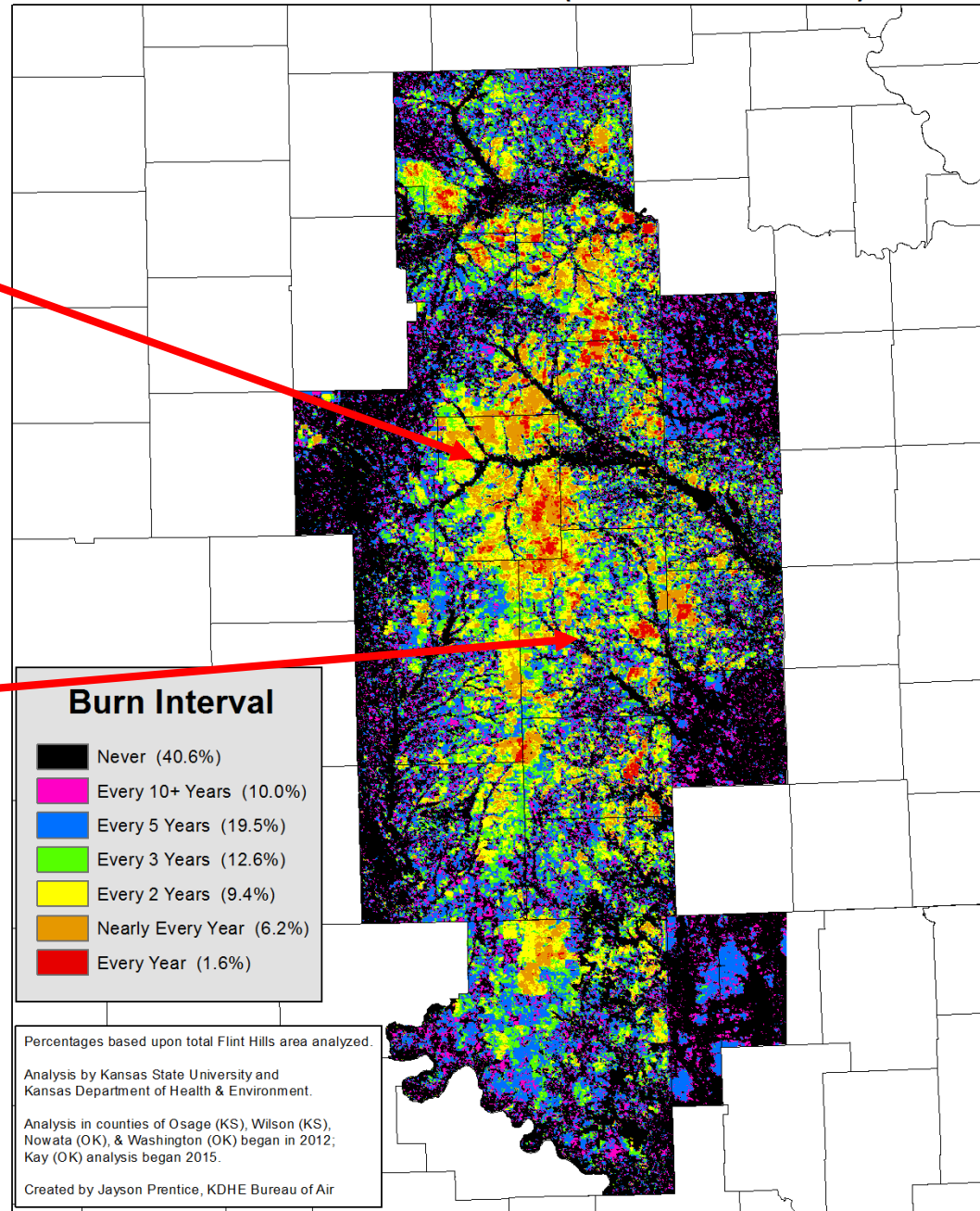
Satellite Analysis from:
Kansas State University
Kansas Department
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Map Created by
Jayson Prentice

Burn Interval



Flint Hills Burn Intervals (2000-2016 Data)



April 4, 2016

Wichita/Sedgwick Co.

Ozone Exceedance

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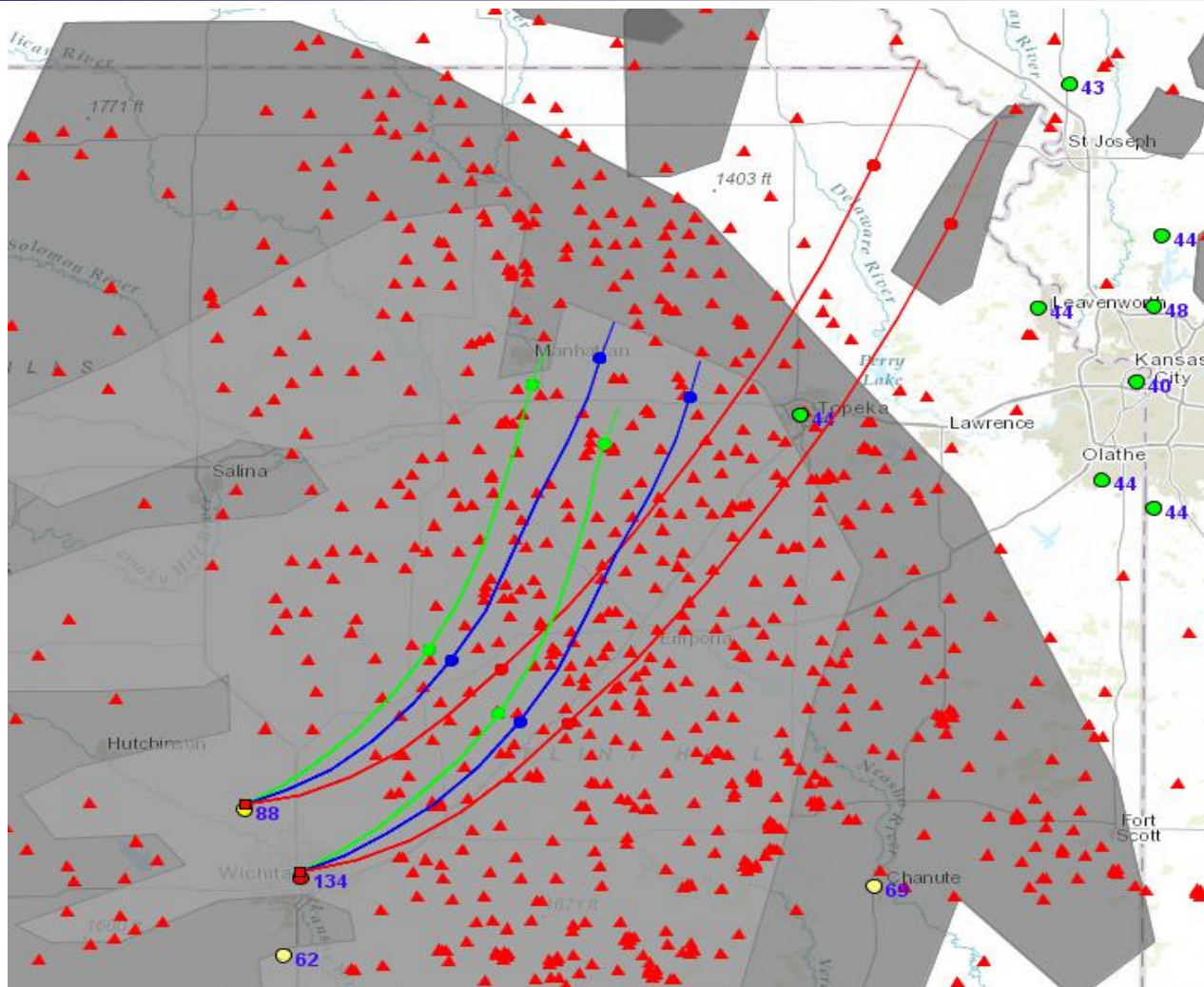




Credit: Bo Rader, The Wichita Eagle

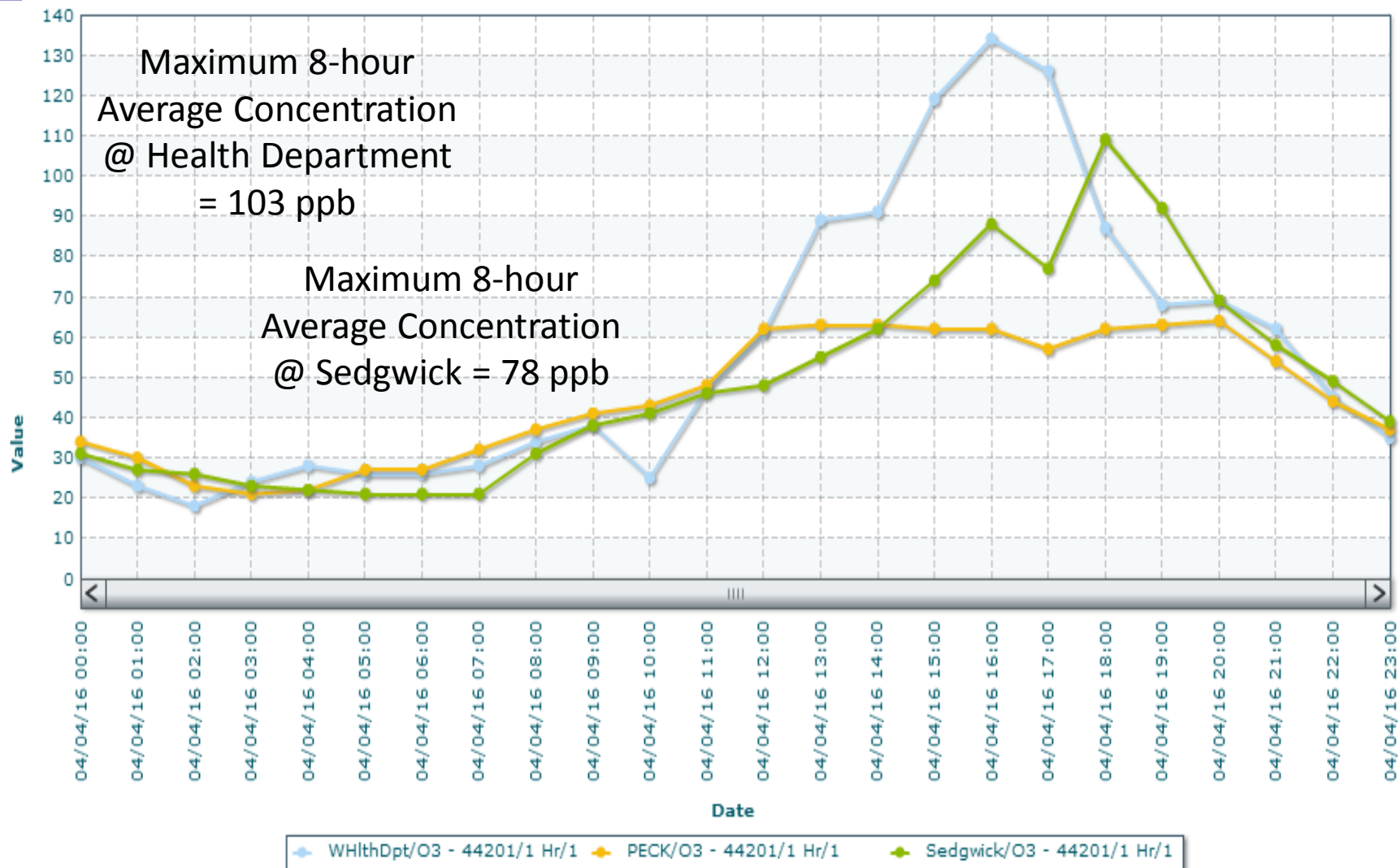
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HYSPLIT backward air trajectories for previous 12 hours at heights of 10 meters (green), 100 meters (blue), and 500 meters (red), valid at 5pm CDT, April 4, 2016. Hourly ozone values shown.

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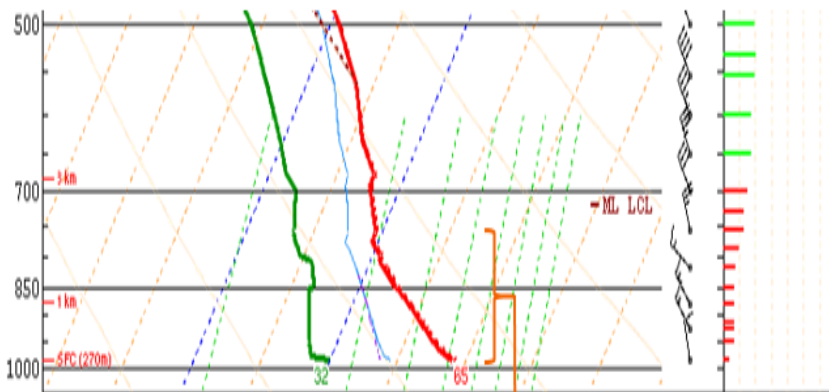


Hourly Ozone Values on April 4, 2016 at Wichita Area Ambient Air Monitors

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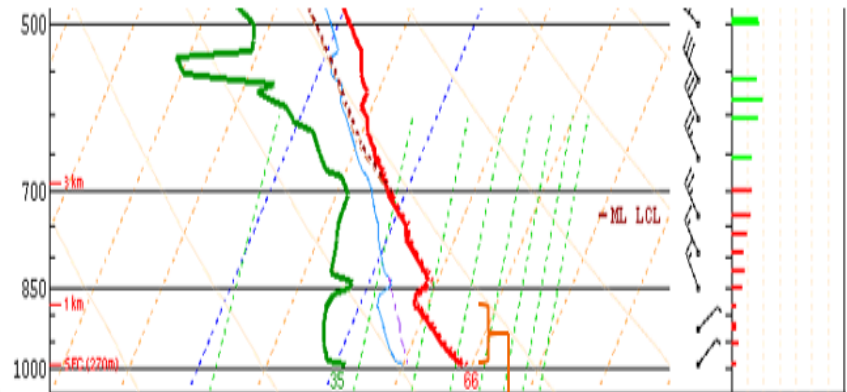
Upper Air Soundings from Topeka, KS

7pm April 2, 2016



Mixing height 6000+ feet
Transport Winds 10-30 mph

7pm April 4, 2016



Mixing height ~3000 feet
Transport Winds 5-10 mph

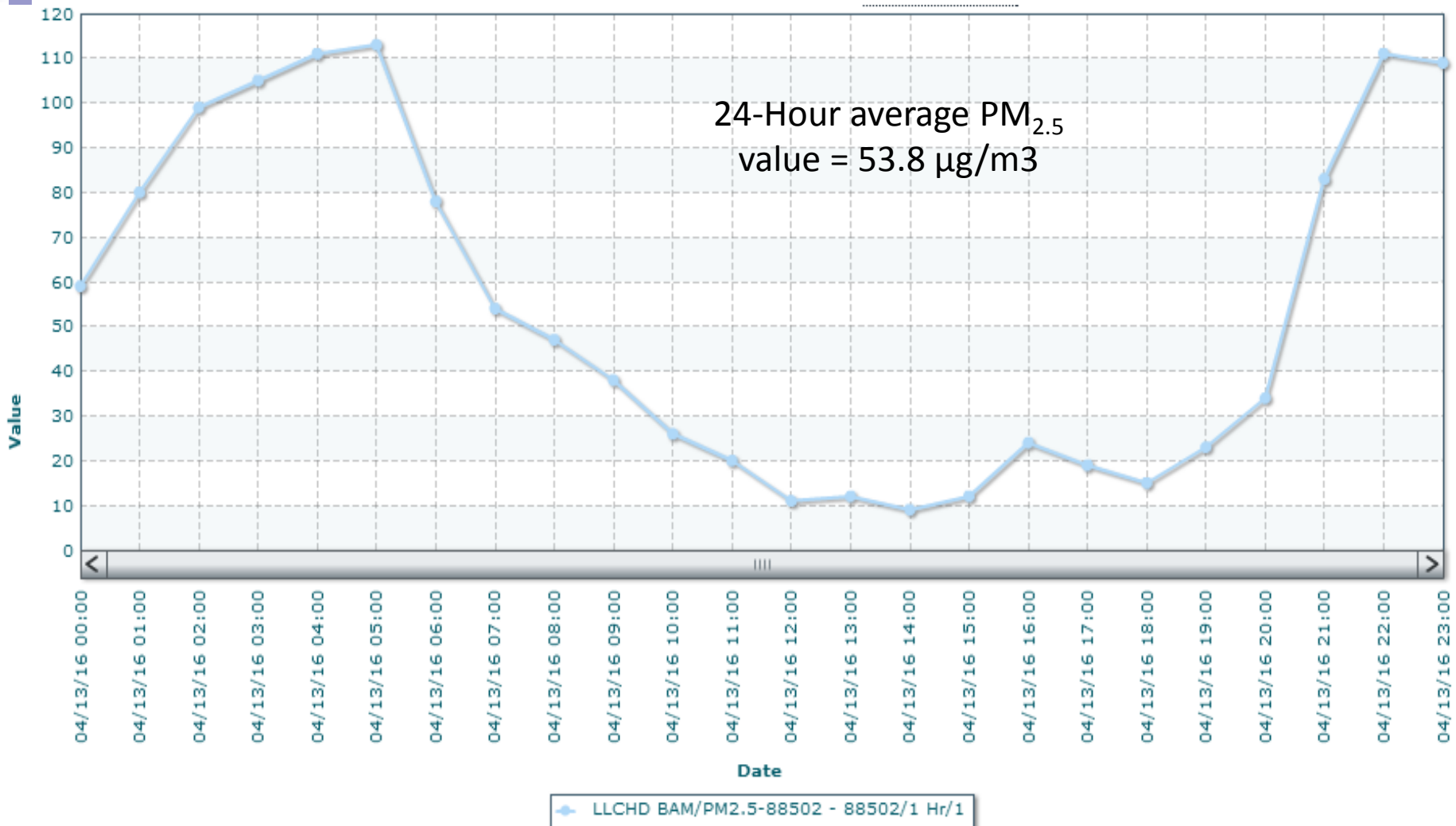
- Similar number of fires two days earlier on April 2 so why no exceedances???
- Different wind direction
- Mixing Height
- Transport Winds

April 13, 2016 Lincoln, NE PM_{2.5} Exceedance



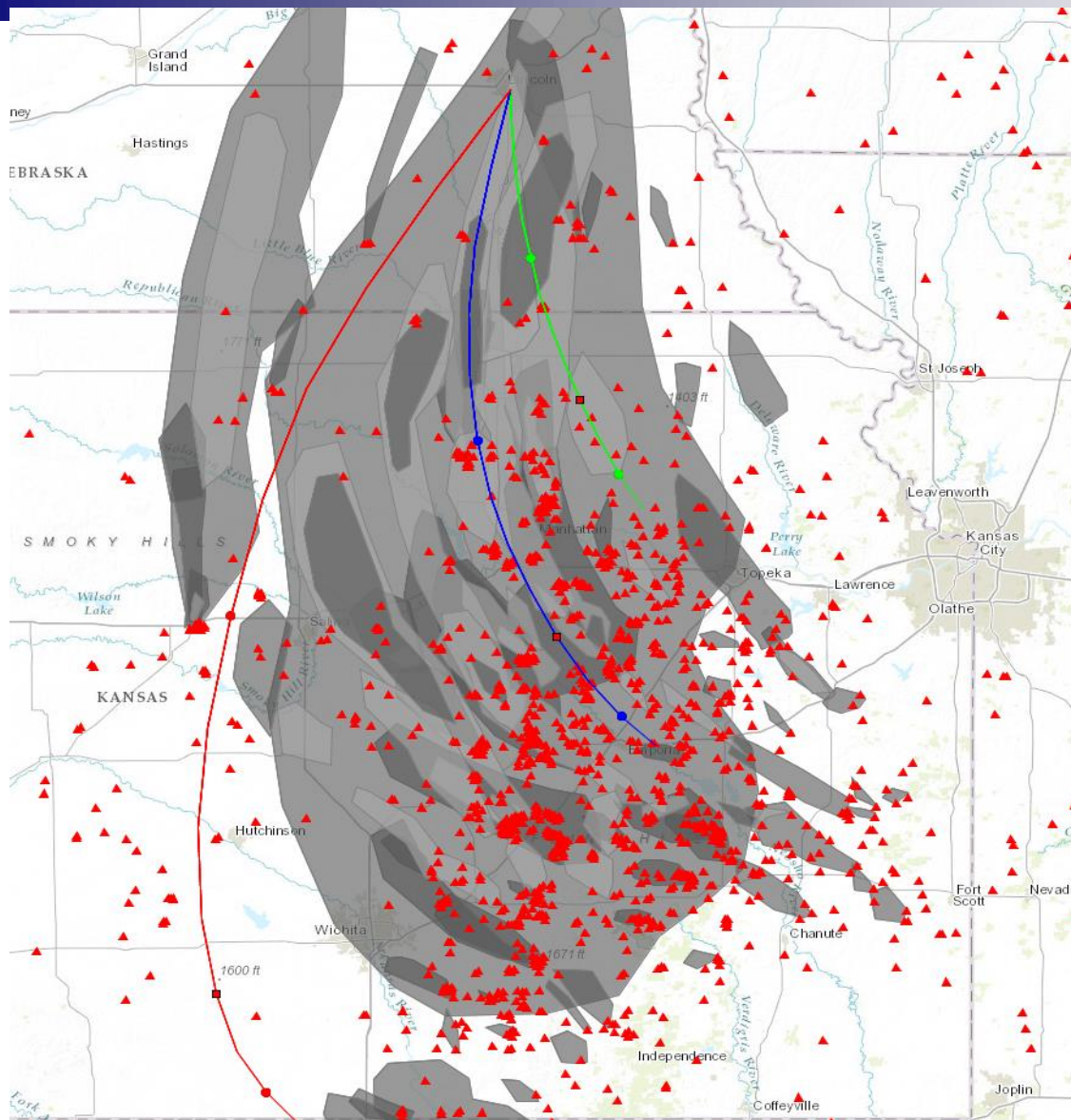
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Hourly PM_{2.5} Values on April 13, 2016 at Lincoln-Lancaster County Health Department

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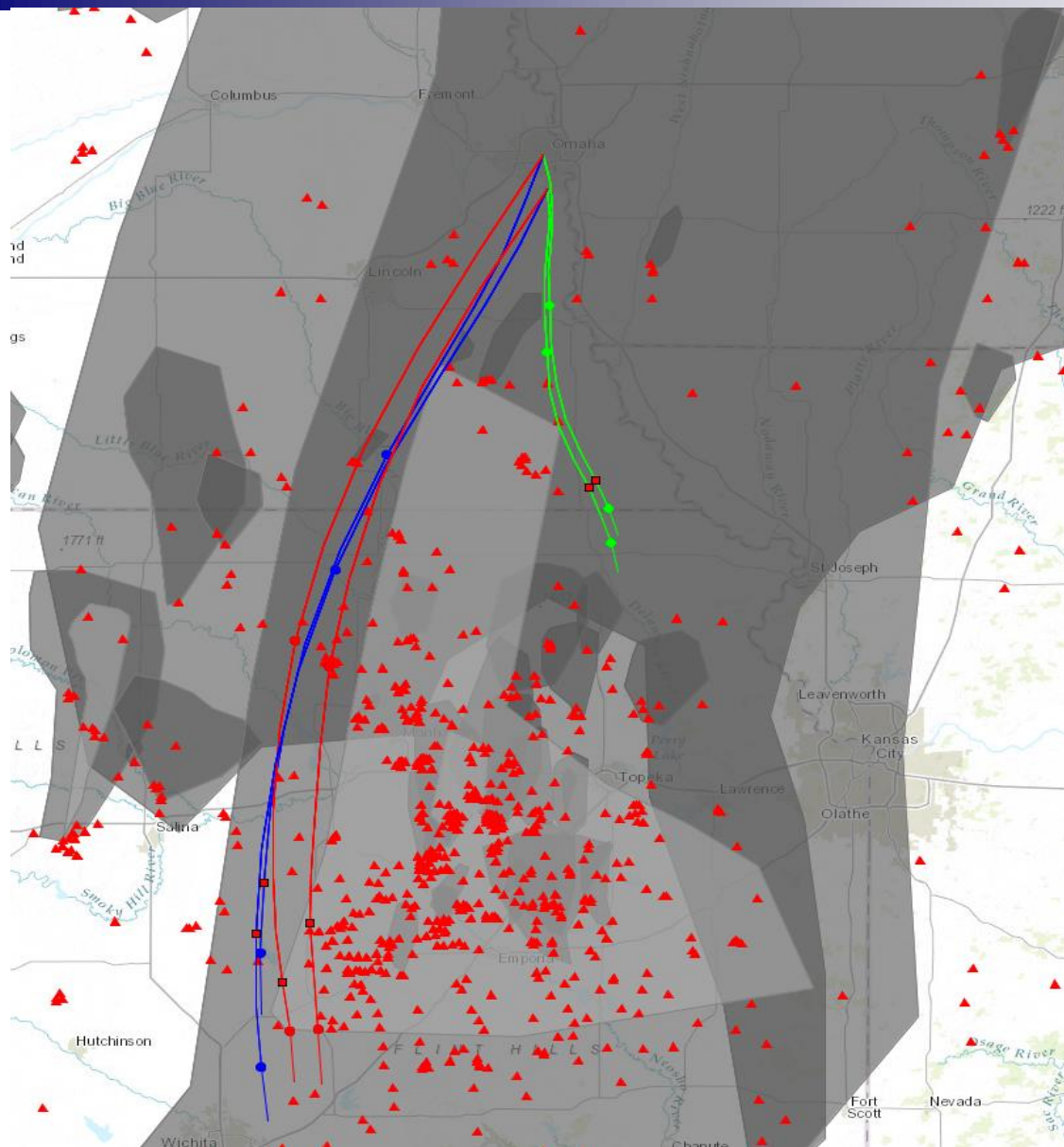
HYSPLIT backward air trajectories for previous 12 hours at heights of 10 meters (green), 100 meters (blue), and 500 meters (red), valid at 6am CDT, April 13, 2016.

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April 14, 2016 Omaha, NE PM_{2.5} Exceedance

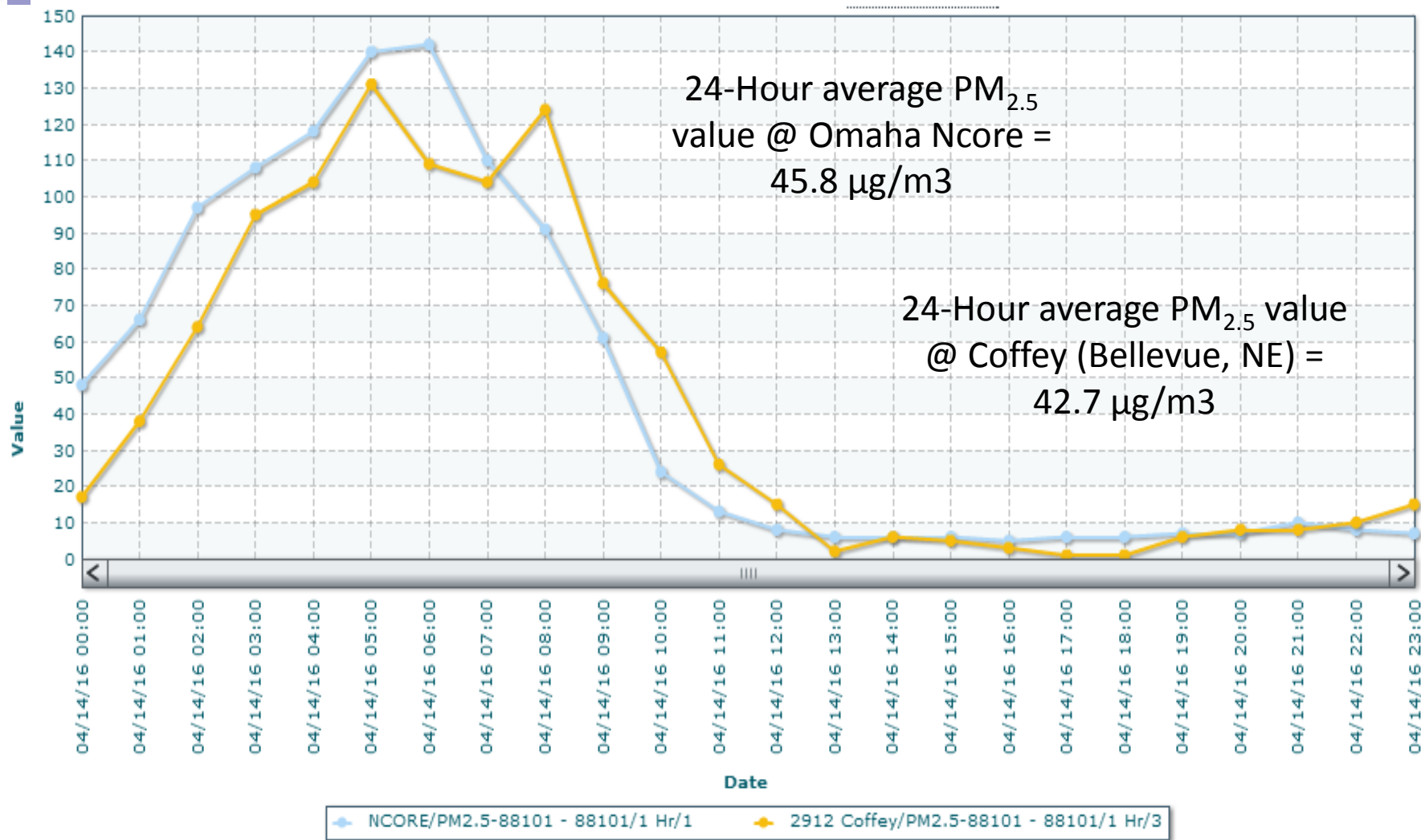
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HYSPLIT backward air trajectories for previous 12 hours at heights of 10 meters (green), 100 meters (blue), and 500 meters (red), valid at 6am CDT, April 14, 2016.

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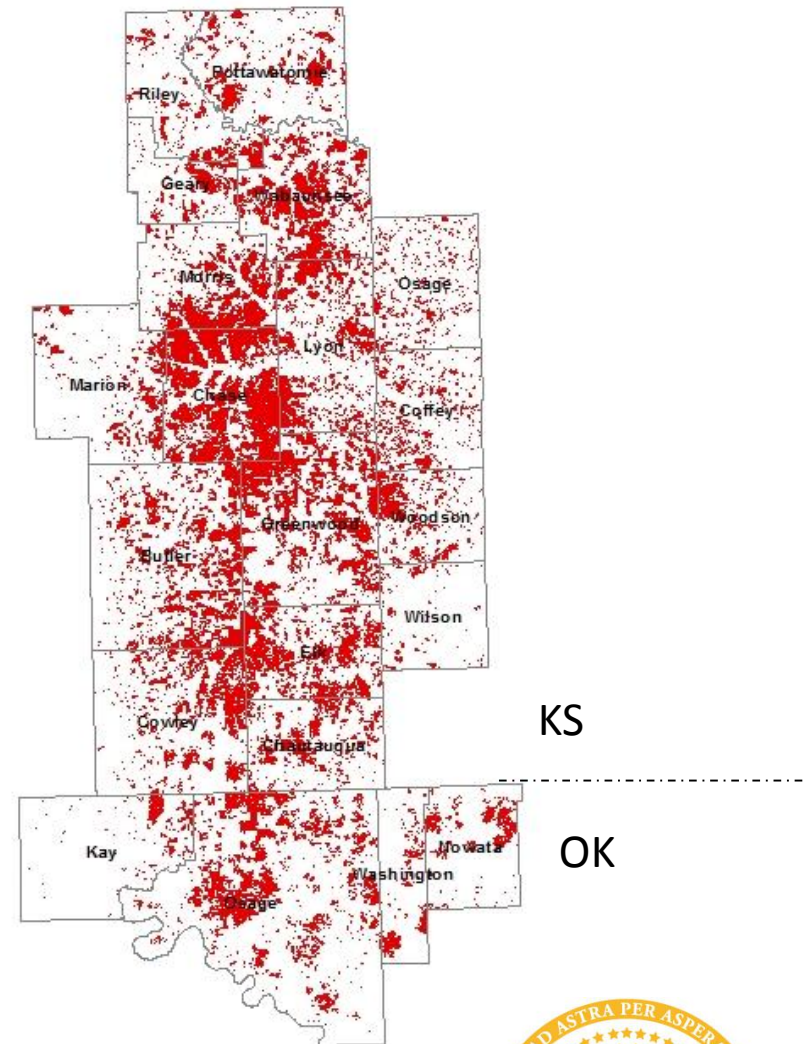


Hourly PM_{2.5} Values on April 14, 2016 at Omaha area monitors

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Satellite Derived Acres Burned in Flint Hills – Feb. 27 – May 5, 2016


Counties	DOY126 (5/5)
Butler	245,921
Chase	318,679
Chautauqua	94,473
Coffey	76,450
Cowley	158,984
Elk	171,757
Geary	51,492
Greenwood	284,624
Lyon	174,213
Marion	75,647
Morris	149,780
Osage (KS)	64,974
Pottawatomie	89,114
Riley	64,110
Wabaunsee	199,804
Wilson	23,136
Woodson	79,276
Nowata (OK)	48,186
Osage (OK)	301,258
Washington (OK)	32,387
Kay (OK)	32,526
Total	2,736,791



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www.ksfire.org Website Home Page

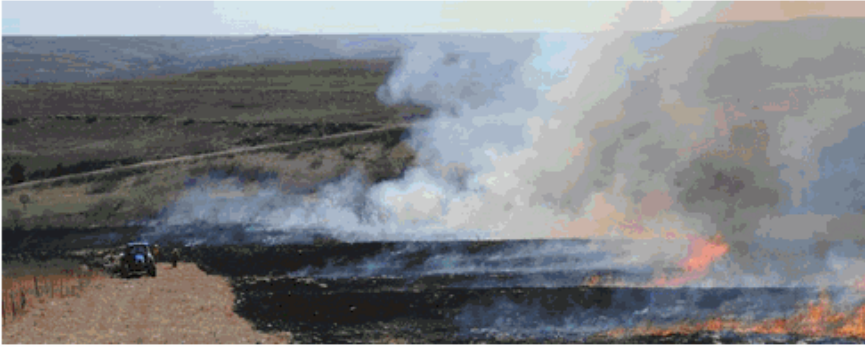
- Developed as part of SMP
- One stop shop for land managers
- Smoke Modeling tool



Kansas Flint Hills
SMOKE MANAGEMENT

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*NEW SMOKE MODEL for mobile device



Kansas Flint Hills Smoke Management


Welcome to the Kansas Flint Hills Smoke Management Website. This site has been developed to provide one location for land managers conducting prescribed burns in the Flint Hills to obtain information and access tools to assist them in making burn decisions.

The website is the result of the development of the Flint Hills Smoke Management Plan. It provides training, regulations, policies, publications, a modeling tool and other links to guide people looking for information on smoke management.

The development of the Flint Hills Smoke Management Plan is an attempt to balance the need for prescribed fire in the Flint Hills with the need for clean air in downwind communities. The plan does not include any provisions that restrict the burning of grasslands in the Flint Hills.

Instead, the plan takes a voluntary approach toward improving air quality during the burn season. The plan's voluntary approach leaves flexibility in the hands of the land manager but also puts the responsibility on him or her to make wise decisions.

The plan and website are cooperative efforts of countless persons with many perspectives on Flint Hills burning. We encourage land managers to use the site and to provide us feedback on organization, content, ease of use, and ways in which the site can be improved for the next burn season.



AT A GLANCE

- [2013 Flint Hills Acres Burned](#)
- [April Burning Restrictions.pdf](#)
- [Smoke Management Plan Kansas Department of Health and Environment Bureau of Air](#)
- [Fire Management Practices to Improve Air Quality.pdf](#)
- [County Burn Permit Info.](#)
- [Current Burn Bans](#)
- [Fire Management Practices Pamphlet - KDHE.pdf](#)
- [2013 Air Quality Health Advisory Alert - KDHE](#)
- [Additional Resources](#)
- [Site Map](#)

IN THE NEWS

Videos

- [Preserving the Tallgrass Prairie](#)
 - [Bibliography](#)
- [Through the Haze: Prescribed Fire and Smoke Management](#)

Burn Advisories

03-14-13
04-10-13


Radio Broadcasts

2013 2012 2011

News/Media Archives



- [Acreage Reporting](#)
 - [2011 Pilot Programs](#)

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Access Weather

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Questions



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